CHAPTER 2

Status of Threatened Species

Life Cycle of the Pacific Salmon

"There is no ending here. The ending here is the cycle of the salmon and another cycle of the salmon and another cycle of the salmon which takes us into the future."

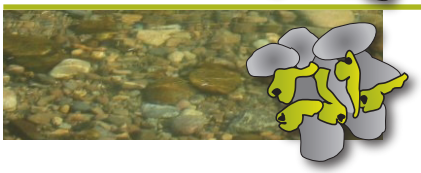
Billy Frank, Jr., Chairman, Northwest Indian Fisheries Commission

The Pacific Northwest is home to seven different species of Pacific salmonids: Chinook, coho, chum, sockeye, and pink salmon; and steelhead and cutthroat trout. The salmon life cycle occurs in a chain of connected environments as they journey through freshwater streams, estuaries, nearshore areas, and the ocean. Each of these habitats provides crucial elements for the salmon's survival as they cycle through their incubation, emergence, freshwater rearing, estuary transition, ocean residence, migration and spawning. The cycle from birth in freshwater streams to the ocean and back defines Pacific salmon as "anadromous." Most Pacific salmonids (though not bull trout) are also "semelparous," meaning that they die after spawning only once. Their total energies are devoted to producing the next generation, and their bodies help enrich the stream for that generation and other wildlife species.

Photo by Eileen Palmer for the Hood Canal Salmon Enhancement Group.

Habitat Determines the Salmon's Survival at Each Stage of the Life Cycle.....

Eggs: Incubation requires clean water, free of contamination and siltation. Disturbance of a single "redd" (nest of eggs) will terminate the survival of thousands of salmon.

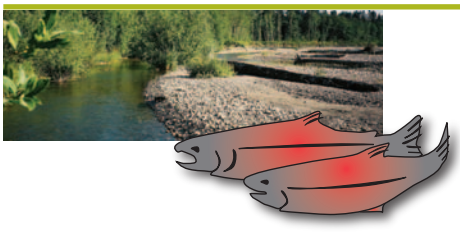


Alevins: During emergence, alevins remain nestled in gravel and feed from their attached yolk sacs. They are highly vulnerable to siltation and gravel scour.

Fry: Feeding is crucial during freshwater rearing. Riparian vegetation helps produce insects, provides cover from predators, and keeps water temperatures cool. Tree roots stabilize streambanks and create habitat structure. Decaying trees form log jams that provide cover and help create side channel refuges for the tiny salmon, away from high velocity flows. Pools and wetlands also provide shelter. Depending on the species, juvenile salmon remain in freshwater from a period of only weeks to over a year before heading to the estuary.

Outmigrants: Juvenile salmon undergo a physiological change known as "smoltification" that enables them to transition from freshwater to saltwater in the estuary. Smoltification can occur primarily within freshwater areas, or almost entirely in the nearshore environment depending on the species, thus they may reside in the estuary to feed and adjust for a period of only days to as much as a year before continuing on to the ocean. The protected waters of the nearshore help them during their migration to the sea. Shoreline logjams, brackish sloughs, marsh plants and eelgrass beds are essential features that provide forage and hiding places along the way.

Sub-Adults/Adults: Maturation occurs during ocean residency over a period from one to five years, leading up to the adult salmon's return to rivers and lakes of their birth. The ranges and patterns of migration vary greatly between the species and the region of origin for specific populations. Shifts in ocean conditions (such as El Nino and Pacific Decadal Oscillations) have been shown to affect food production, alter their typical migration patterns, and result in differences in ocean survival rates. As the adult salmon approach the stream of their origin, they once again undergo a physiological change from saltwater to freshwater, and depend on nearshore and estuary habitats during the transition.



Spawners: Once the adult spawners arrive at their home river mouth, they need adequate flows, cool water temperatures, deep pools and cover to rest and hide as they migrate upstream. Spawners seek clean, loose gravel of an appropriate size in highly oxygenated water for laying their eggs. The site must remain stable throughout incubation and emergence, and allow water to percolate through the gravel to supply oxygen to the developing embryo.